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ABSTRACT

The fourth in a series of reports produced by the Education and Employment Statistics division of the American Insititute of Physics (AIP) is presented. Data are based on a stratified random sample survey of one-sixth of the U.S. and Canadian membership of the AIP member societies. In the spring of 1986, every individual in the sample received a questionnaire in which they were asked to describe their employment in March of 1986. Of the 12,000 society members mailed questionnaires, 64% responded. The overall picture that emerges is a positive one, as members' salaries easily outpaced inflation. The median salary for society members climbed 6.6% from the previous year, and society members with a Ph.D. had a 7.6% increase. Despite this, salary levels continued to vary. The three main factors that dictate the salary levels found throughout the United States are (1) distribution of employment sectors within each division, (2) salary structure for each employer type, and (3) interdivisional age variations. Some facts that emerge are as follows: salary levels vary across employment sectors; across all employment sectors, salaries climb with professional experience; and females employed in industry and at universities earn less than males. Two appendices list geographic divisions (New England, Middle Atlantic, South Atlantic, East North Central, East South Central, West North Central, West South Central, Mountain, and Pacific) and present technical notes (median, quantile calculations, quantiles and interquantile ranges, employment base, sampling error, and cost of living). (SM)

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1986 SALARIES:
SOCIETY MEMBERSHIP SURVEY

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1986 SALARIES:

SOCIETY MEMBERSHIP SURVEY

W. Keith Skelton, Dawn Kellman, and Roman Czujko

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

Median salaries for PhD society members resident in the Canadian provinces of Quebec and Ontario in the accompanying figure are presented in Canadian dollars. The salaries in Quebec are somewhat lower, partly reflecting the heavier academic composition of the members residing there.

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INTRODUCTION

Background

"1986 Salaries: Society Membership Survey" is the fourth in a series of reports produced by the Education and Employment Statistics division of AIP. Initiated in 1982, the series provides reliable nationwide data on the salaries of members of AIP Member Societies. In the past, employers, those testifying before Congress and society members-at-large have found this kind of resource useful.

Methodology

The data presented here are based on a stratified random sample survey of one-sixth of the U.S. and Canadian membership of the AIP Member Societies. This sampling frame oversamples the smaller societies so that each of the ten[1] AIP Member Societies are equally well represented. Each year, the survey follows-up on previous respondents and expands to include a sampling of new members. In this way, the survey maintains access to the changing trends associated with the growth of the member societies. Those eligible for inclusion in the 1986 sample had memberships which were current as of December 1985.

In the spring of 1986, every individual in our sample received a questionnaire in which they were asked to describe their employment in March of 1986. The brief, one-page form asked for such information as work activity, level of highest degree, salary, and type of employer. A postage-paid return envelope was provided. Several weeks after the initial mailing, a second wave of questionnaires was mailed to those sample members who had not yet returned a completed form. Of the approximately 12,000 society members who were mailed a questionnaire, 64% responded.

Results

Overall, the picture that emerges is a positive one. Members' salaries easily outpaced inflation, which was at a record low (2.3%) in 1986. The median salary for society members climbed 6.6% from the previous year, to $47,000. Society members with a PhD, who comprise over three-quarters of the membership, fared even better. They earned a median annual salary of $49,500, which represents a 7.6% increase.

Despite this, salary levels continued to vary considerably. The figures, tables and text that follow describe in detail salary variation by geographic location, employer, level of highest degree, primary work activity, and sex. For those seeking aggregate data not found in this report, the division has

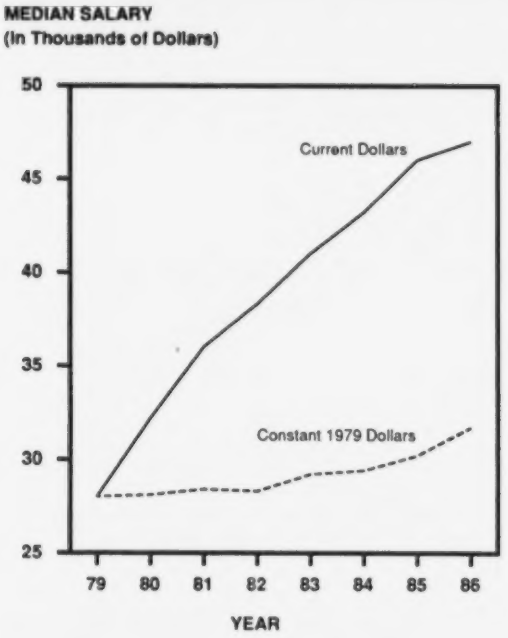

Figure 1. Median salaries for PhDs, 1979–1986. Both reported salaries and salaries adjusted for inflation are presented.

statistical resources that may be of value. Please contact the division for more information on special requests.

Most of the discussion in this document centers on median and quartile salaries, which are the preferred descriptive measures of central tendency and variation in typically skewed salary distributions. The tables also present salary means and standard deviations, as well as median ages, which are useful for comparative analyses. Please consult Appendix B for definitions and technical notes on the measures used in this report.

Caveats

While the majority of this report describes the various salary structures found in March 1986, salary changes between 1985 and 1986 will also be

[1]While the American Geophysical Union in now a Member Society of AIP, it was not at the time of this survey.

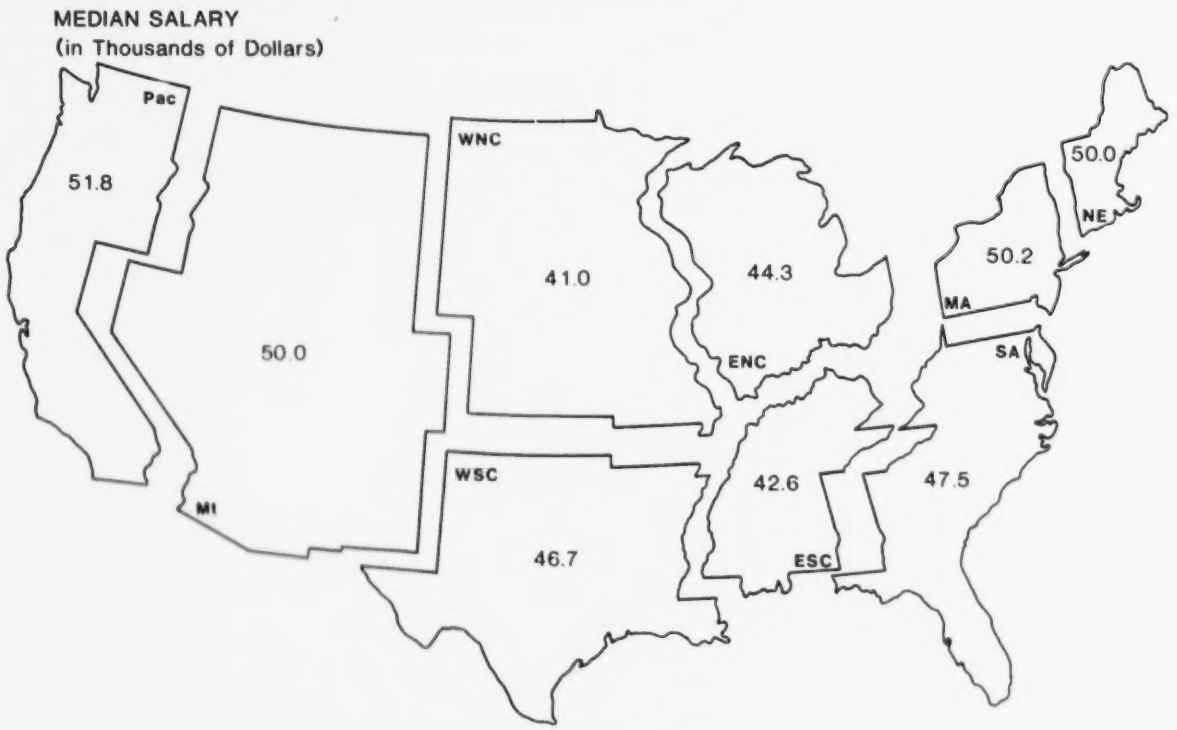

Figure 2. Variation in median salary for PhDs by geographic division, 1986.

mentioned. For the most part, these comparisons will be cross sectional, e.g., the 1985 median salary of industrially employed PhDs will be compared with the median salary of industrially employed PhDs in 1986. From the point of view of employers, this kind of comparison reflects the "going rate" for such personnel, but caution must be exercised. Cross-sectional analyses reflect net salary changes and are sensitive to any movement into or out of that particular subgroup, such as an influx of young employees, or retirements. For employers and society members seeking data on typical salary increases they may be misleading.

One final note: salary tables discussing lower-degree holders must be interpreted with caution. According to the National Science Foundation (NSF), of all physicists employed in 1986, 21% held only a Masters degree and 23% held only a Bachelors degree. By contrast, 18% of our membership holds only a Masters degree and 8% only a Bachelors. Thus, lower degree holders are poorly represented in the membership. Those who are members tend to be atypical, with a special interest in specific society programs.

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• The three main factors that dictate the salary levels found throughout the United States are (1) the distribution of employment sectors within each division, (2) the salary structure for each employer type, and (3) the inter-divisional age variations.

Table 1. 1986 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	50.0	52.0	19.6	44	323
Middle Atlantic	50.2	53.2	20.7	44	693
South Atlantic	47.5	49.5	16.9	45	613
East North Central	44.3	46.3	16.3	45	466
East South Central	42.6	43.9	12.0	46	136
West North Central	41.0	43.5	16.3	44	133
West South Central	46.7	49.5	17.4	45	200
Mountain	50.0	49.9	16.4	44	334
Pacific	51.8	54.4	20.5	44	735
Canada[b]	52.0	53.0	16.2	45	141

[a] See Appendix A for state composition of each division.
[b] Canadian salaries are reported in Canadian dollars. One U.S. dollar = 1.43 Canadian dollars.

Table 2. 1986 salaries by selected employment sector and geographic division, PhDs.

	Academic			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	43.0	46	52	58.3	43	31	51.8	43	17
Middle Atlantic	41.3	47	43	58.7	42	46	50.8	45	11
South Atlantic	40.0	46	41	54.0	43	16	52.0	45	43
East North Central	40.0	47	62	52.0	40	20	48.0	44	18
East South Central	36.0	47	55	*	*	*	52.0	45	39
West North Central	37.6	45	68	49.5	39	25	*	*	*
West South Central	40.0	47	57	56.0	42	36	*	*	*
Mountain	38.0	46	36	57.0	43	16	53.1	43	48
Pacific	44.0	46	33	56.0	42	40	54.0	43	27
Overall	40.0	46	46	56.0	42	29	52.0	44	25

**Number of respondents was too small to calculate reliable medians.*

• From one region of the country to the next, median salaries for industrially employed members are consistently higher than those in other employment sectors. Salary differences between academically employed society members and those working in industry represent the greatest disparity, with salary differences ranging from $11,900 in the West North Central to $19,000 in the Mountain States. In addition, academically employed members are three to seven years older than those in industry. The distribution of states within each division can be found in Appendix A.

• Though the industrial median salary in the Pacific division falls in line with the national average for that employment sector, salaries within academe and the National Laboratories are the highest in the country. Consequently, society members employed on the Pacific coast maintain the highest overall median salary at $51,800. One should note that nearly 90% of the membership who live in the Pacific Division reside in California. The large population of members in California therefore overshadows the influence that Washington, Oregon, Hawaii and Alaska have on divisional statistics.

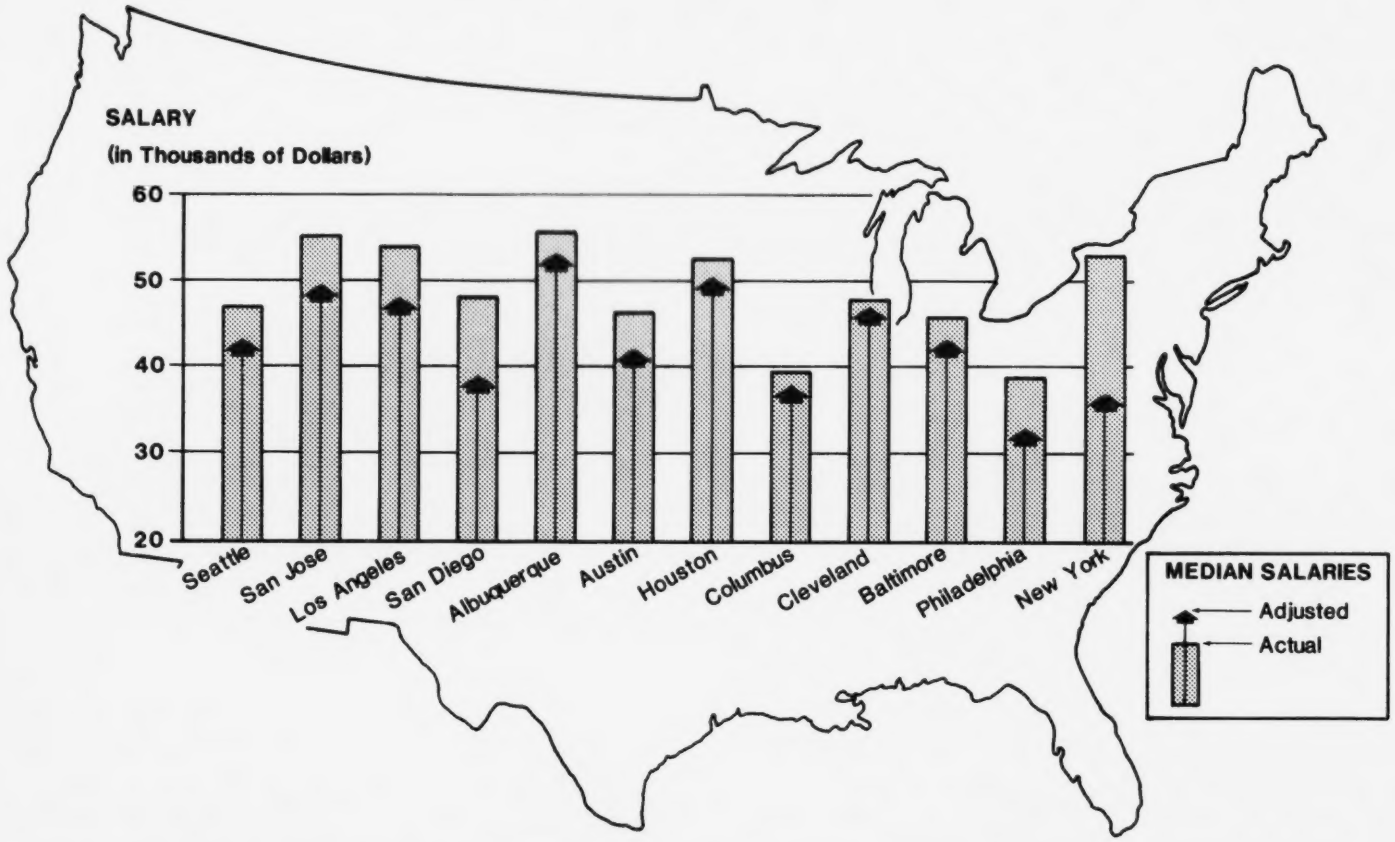

Figure 3. Median salaries for PhDs in 12 metropolitan areas, 1986. Both actual salaries and salaries adjusted for cost of living are presented.

- The lowest overall salary is observed in the West North Central at $41,000. This is primarily a result of the large proportion of academically employed society members earning the lowest PhD salaries in the nation.

- Industrially employed society members residing in New England and the Middle Atlantic states command the highest salaries in the nation, in excess of $58,000 annually.

- The cities listed in Table 3 all volunteered to participate in a survey developed by the American Chamber of Commerce Researchers Association. The questionnaire was developed to "provide a useful and reasonably accurate measurement of inter-city cost of living differences." The cost of living index represents a market basket of goods and services for the first quarter of 1986. Certain cities (Chicago, Washington D.C., San Francisco, and others) are notably absent from the list due to a lack of response to the survey.

Table 3. 1986 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	104.4	55.6	53.3	43	13	87	52
Austin	110.4	46.5	42.1	44	76	24	29
Baltimore	105.9	46.0	43.4	43	49	51	35
Cleveland	101.6	48.0	47.2	41	32	68	22
Columbus	103.9	39.6	38.1	46	75	25	36
Houston	104.7	52.6	50.2	43	43	57	46
Los Angeles	112.3	54.0	48.1	44	30	70	130
New York	142.0	53.0	37.3	47	47	53	113
Philadelphia	117.9	39.0	33.1	43	60	40	40
San Diego	122.7	48.3	39.4	45	36	64	50
San Jose	111.2	55.0	49.5	41	28	72	42
Seattle	108.8	47.0	43.2	40	58	42	20

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0*

$$\text{Adjusted salary} = \frac{\text{Median Salary}}{\text{cost of living \%}}$$

• There is a direct relationship between the size of a metropolitan area and the cost of living. In general, society members reside in larger, more expensive, urban centers where employment opportunities are more likely to be found for physicists with advanced training. As a consequence, all of the cities listed in Table 3 have a higher cost of living index than the national average (100).

• During the 1985–1986 academic year only seven states produced more advanced physics degrees than the universities in the single city of Philadelphia, Pennsylvania. The presence of a large number of prestigious institutions in this metropolitan area results in an over-representation of society members working in academe. The generally lower salaries earned by academicians, as compared to colleagues in other sectors, produces a unweighted median salary $10,000 less than the national average. This fact in conjunction with the high cost of living in Philadelphia results in the lowest adjusted median salary among all cities listed in Table 3.

• Philadelphians can take heart in that their colleagues working in nearby New York City are living in one of the most expensive cities in the United States. PhD society members living in the New York metropolitan area have a median salary $3,500 above the national median. While this initially appears attractive, members making the $53,000 median salary in New York earn an adjusted salary $12,000 less than the national median. In addition society members in New York are, in general, older than their colleagues in other cities.

• Albuquerque, New Mexico, Houston, Texas and San Jose, California are the only cities listed in Table 3 that maintain adjusted salaries at or above the national median of $49,500. While Albuquerque and Houston maintain a relatively low cost of living, the high salaries observed in all three cities are a function of the over-representation of members employed in industry or at the National Laboratories. Houston and San Jose members are concentrated in the industrial sector. In general, those residing in San Jose are working for "High Tech" firms while those in Houston are employed at petroleum-related corporations. The majority of members residing in Albuquerque work for Sandia National Laboratories, a Federally Funded Research and Development Center (FFR&DC). In 1986, the median salary for PhDs employed at National Laboratories was $53,000, $3,500 over the national median and second only to industry.

Table 4. 1986 salaries and employment sector distribution for selected states and Canadian provinces, PhDs.[a]

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known	Academic %	Industry %	Gov't %	FFR&DC[b] %	Other %
	(in thousands of dollars)									
Alabama	41.5	44.7	11.4	47	28	70	7	19	–	4
Arizona	42.0	44.4	15.4	44	49	65	17	4	10	4
California	52.8	55.4	20.6	43	662	30	41	4	21	4
Northern	53.9	56.3	22.6	43	316	26	34	4	29	7
Southern	52.3	54.6	18.5	44	345	34	47	3	13	3
Colorado	46.7	48.7	17.8	44	92	50	29	14	6	1
Connecticut	50.0	52.4	26.6	44	69	53	35	8	–	4
Delaware	45.3	48.8	13.3	42	22	35	61	–	–	4
DC	55.7	55.2	13.5	46	147	5	2	88	–	5
Florida	41.2	44.2	15.2	46	48	72	13	10	–	5
Georgia	48.0	46.9	17.8	45	40	81	17	–	–	2
Illinois	44.0	47.5	17.8	44	160	52	17	–	28	3
Indiana	41.2	45.2	15.0	47	52	84	14	–	–	2
Iowa	37.6	40.6	19.8	45	26	86	–	–	12	2
Kansas	39.0	41.6	19.2	45	20	95	5	–	–	–
Louisiana	40.4	43.1	12.3	48	22	82	14	–	–	4
Maryland	47.5	48.3	15.1	43	162	31	23	39	3	4
Massachusetts	51.5	52.8	17.1	43	221	50	30	11	5	4
Michigan	42.6	47.7	18.4	45	85	63	30	2	–	5
Minnesota	45.0	47.5	15.1	40	39	36	63	–	–	1
Missouri	42.0	45.2	15.7	44	28	64	28	3	–	5
New Jersey	55.0	59.0	20.4	42	204	19	72	2	6	1
New Mexico	53.4	55.0	14.6	44	146	9	7	6	76	2
New York	50.0	52.4	21.0	45	341	51	36	1	7	5
Northern	48.0	51.1	21.9	45	180	59	37	1	1	2
Southern	50.8	54.0	19.9	45	161	42	35	–	14	9
North Carolina	43.0	45.4	19.6	45	50	79	11	4	–	6
Ohio	47.4	46.0	13.3	46	121	60	20	10	3	7
Oklahoma	45.1	49.0	17.0	43	21	46	48	4	–	2
Pennsylvania	46.0	47.1	18.2	45	147	60	31	5	–	4
Tennessee	46.6	45.4	12.0	45	85	42	6	–	51	1
Texas	49.0	51.3	18.2	44	147	52	41	1	–	6
Utah	42.5	43.2	16.7	45	22	82	16	–	–	2
Virginia	48.0	52.8	20.0	46	105	47	23	18	6	6
Washington	46.0	47.1	17.7	43	41	51	40	–	9	–
Wisconsin	37.8	41.3	15.4	44	47	80	17	–	–	3
Ontario	53.7	52.8	15.4	45	61	61	12	26	–	1
Quebec	50.0	51.6	19.3	45	29	90	10	–	–	–

[a] Several states were not included above because the number of respondents was too small to calculate reliable statistics.
[b] Federally Funded Research and Development Center.

Table 5. 1986 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
University					
9–10 Month Salary	41.0	43.5	13.1	49	811
11–12 Month Salary	45.0	46.5	19.0	43	514
4-Year Colleges					
9–10 Month Salary	31.6	32.8	8.2	46	134
Industry/Self-Employed	56.0	59.9	19.7	42	1049
Government	51.5	51.5	11.9	46	344
FFR&DC	53.0	54.0	14.5	43	431
Nonprofit	50.0	54.0	30.2	43	92
Hospital	53.0	56.2	19.5	45	47

Table 6. 1986 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–4	35.4	35.3	11.0	32	483
5–9	43.6	43.8	13.3	36	611
10–14	50.0	49.8	15.5	41	638
15–19	51.0	53.1	17.1	45	677
20–24	54.0	56.1	18.2	50	505
25–29	57.7	60.0	18.2	55	322
30 +	60.1	62.7	23.7	62	381

SALARIES AND EMPLOYMENT SECTOR FOR PhDs

- In 1986 the median salary for PhDs rose to $49,500, a 7.6% increase from 1985. During the same period, the national inflation rate slowed to 2.3%, its lowest point in eight years. This translated into a real increase in take-home-pay for PhD society members.

- Salary levels vary across employment sectors. For example, a scientist working at a four-year college will, for the most part, earn considerably less than a colleague with the same amount of experience working in government. The variation in salary level between sectors begins at the lowest levels of experience and continues throughout a professional career.

- A recent doctorate entering the labor force can expect to command the highest starting salary by entering the private sector. In 1986 the median industrial starting salary reached $44,300. By comparison, those starting their careers in national laboratories received a somewhat lower median starting salary of $42,000, those in government $37,000.

- At all levels of experience, industrially employed PhDs receive the highest salaries. The best paid industrial PhDs, those at the highest level of experience, commanded salaries of $100,000 or more in 1986. The self-employed are among these top wage earners.

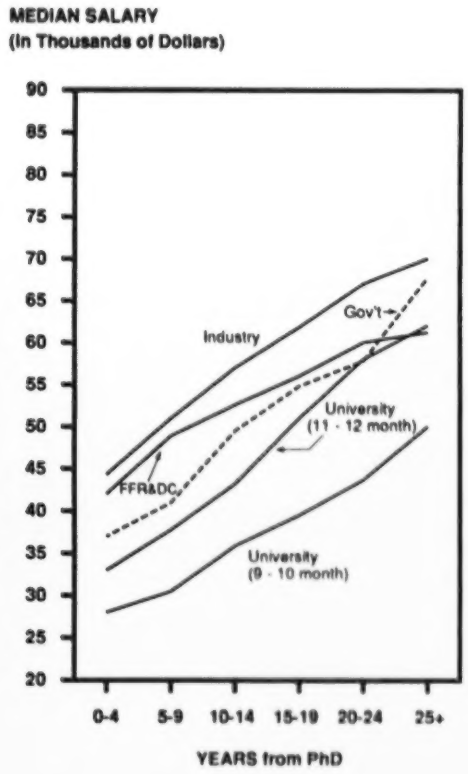

Figure 4. Median salaries by type of employer and years from PhD, 1986.

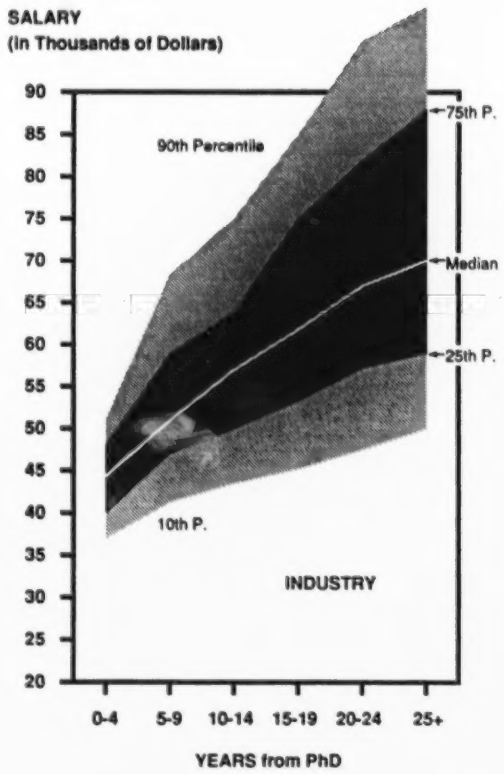

Figure 5. Salary structure in industry by years from PhD, 1986.

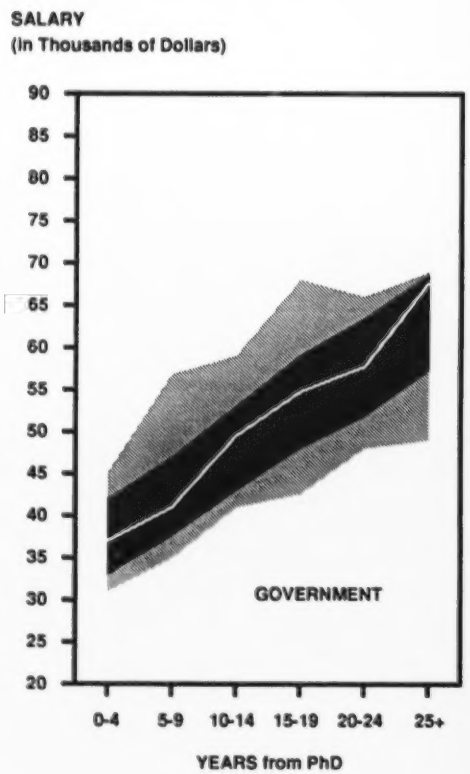

Figure 6. Salary structure in government by years from PhD, 1986.

• Median academic salaries continue to fall short of salaries paid to PhDs outside academe. In 1986, overall median academic salaries ranged from $31,600 in four-year colleges to $45,000 in universities.

• Across all employment sectors, salaries climb with professional experience. Yet each sector has it's own unique salary distribution. In industry, salaries are clustered within a narrow range at entry-level but broaden considerably with experience. Typical industrial salaries vary by as little as $8,000 at entry-level and by as much as $29,000 at the highest level of experience. The broad salary range is due, in large part, to the multiple career paths available in industry, paths ranging from bench scientist to corporate executive.

Table 7. 1986 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	37.0	40.0	44.3	48.0	51.0	44.6	8.2	32	156
5–9	41.3	47.0	51.0	59.0	68.2	53.5	11.2	36	228
10–14	43.5	50.0	57.0	64.0	75.0	58.7	14.4	41	200
15–19	45.2	53.3	61.8	75.0	85.0	64.7	16.8	45	184
20–24	47.5	57.2	67.0	82.0	96.0	71.8	24.7	50	107
25 +	50.0	59.0	70.0	88.0	100.0	74.8	25.3	59	153

[a] *In addition, there were 12 postdoctorates with a median salary of $37,000.*

Table 8. 1986 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	31.0	33.0	37.0	42.0	45.0	38.3	7.8	32	30
5–9	35.0	37.6	41.0	47.0	56.8	43.4	8.6	39	46
10–14	41.0	43.0	49.5	53.1	59.0	49.0	6.9	42	73
15–19	42.6	48.0	54.8	59.2	68.0	54.1	8.4	46	62
20–24	48.0	51.8	57.8	63.6	66.0	57.5	8.3	50	51
25 +	49.0	57.3	67.7	68.7	68.9	62.6	9.6	60	69

[a] *In addition, there were 10 postdoctorates with a median salary of $26,300.*

- Government salaries are dictated, to a large extent, by the structure of the civil service grades. According to the Office of Personnel Management, government employees across all degree levels who worked in physics in 1986 were, on the average, in General Schedule Grade 13. Except at the highest level of experience, government workers are still paid well below industry rates and there is increasing pressure within the public sector to be more competitive with industry.

- In the past, government employees have typically received "comparability" increases. These are percentage increases given to federal employees to narrow the gap between government and industrial salaries. However, according to the Advisory Committee on Federal Pay, in 1986 "the civilian work force pay was frozen at the January 1985 level." Thus, while some individuals may have received salary increases in 1986, the overall increase across individuals was kept at zero.

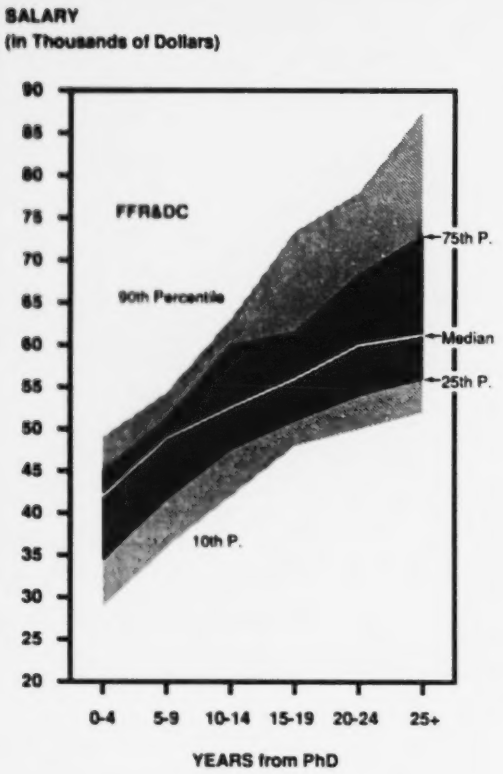

Figure 7. Salary structure in the national laboratories by years from PhD, 1986.

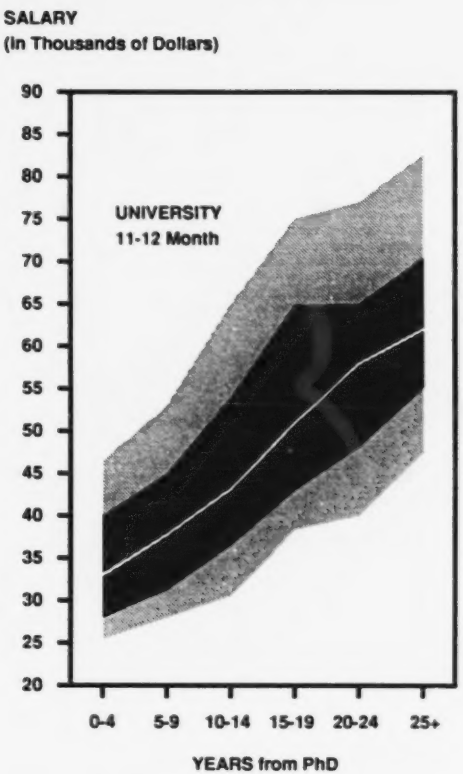

Figure 8. Salary structure in universities for 11–12 month salary base, by years from PhD, 1986.

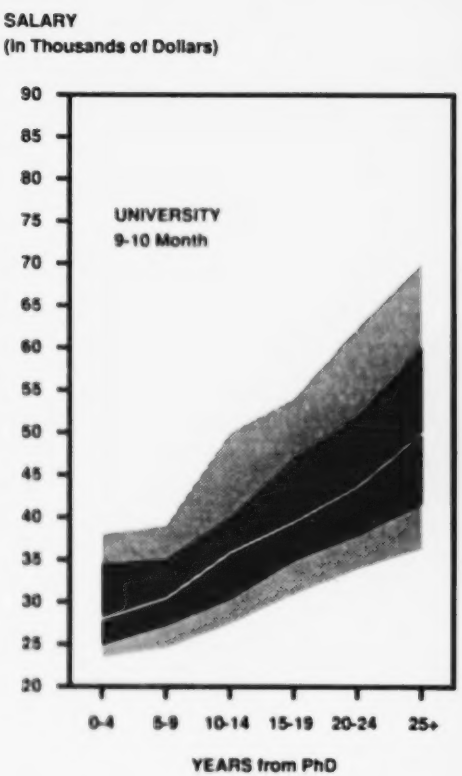

Figure 9. Salary structure in universities for 9–10 month salary base, by years from PhD, 1986.

• Salary ranges for those working on a 9–10 month salary base in universities are relatively narrow at each level of experience. More variability is observed in the university 11–12 month salaries, reflecting the wide range of academic positions including tenured and non-tenured staff, administrative personnel and professors receiving federal grants.

Table 9. 1986 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	28.8	34.5	42.0	45.0	49.0	40.4	7.5	32	40
5–9	36.0	41.7	48.9	51.2	54.3	46.9	7.9	36	68
10–14	42.0	47.6	52.6	60.0	63.0	53.0	9.5	40	85
15–19	48.0	51.0	56.0	61.6	73.4	58.0	10.1	45	94
20–24	50.0	54.0	60.0	68.4	78.0	61.8	10.3	50	56
25 +	52.0	56.0	61.2	73.0	87.5	66.4	16.9	58	67

[a] In addition, there were 17 postdoctorates with a median salary of $25,000.

Table 10. 1986 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	25.5	28.0	33.0	40.0	46.5	34.3	9.0	32	37
5–9	28.0	31.3	37.8	45.0	53.0	39.1	10.2	36	81
10–14	30.6	36.6	43.2	54.0	65.0	46.2	14.0	41	78
15–19	38.4	43.1	51.0	64.9	75.0	56.3	20.4	45	81
20–24	40.0	48.2	58.0	65.0	77.0	57.7	13.9	50	67
25 +	47.5	55.2	62.0	70.5	82.5	64.1	13.6	58	83

[a] In addition, there were 69 postdocs in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $23,000.

Table 11. 1986 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	23.5	25.0	28.0	34.5	38.0	29.6	5.7	32	46
5–9	24.6	27.3	30.5	35.1	39.0	31.7	6.1	36	94
10–14	27.5	30.4	35.9	40.0	50.0	37.1	9.9	41	88
15–19	31.0	35.0	39.5	47.0	54.0	41.2	9.0	45	152
20–24	34.0	38.0	43.7	52.0	62.5	46.1	10.8	49	170
25 +	36.4	41.7	50.0	60.1	70.0	52.0	13.5	59	259

[a] Postdocs exclud

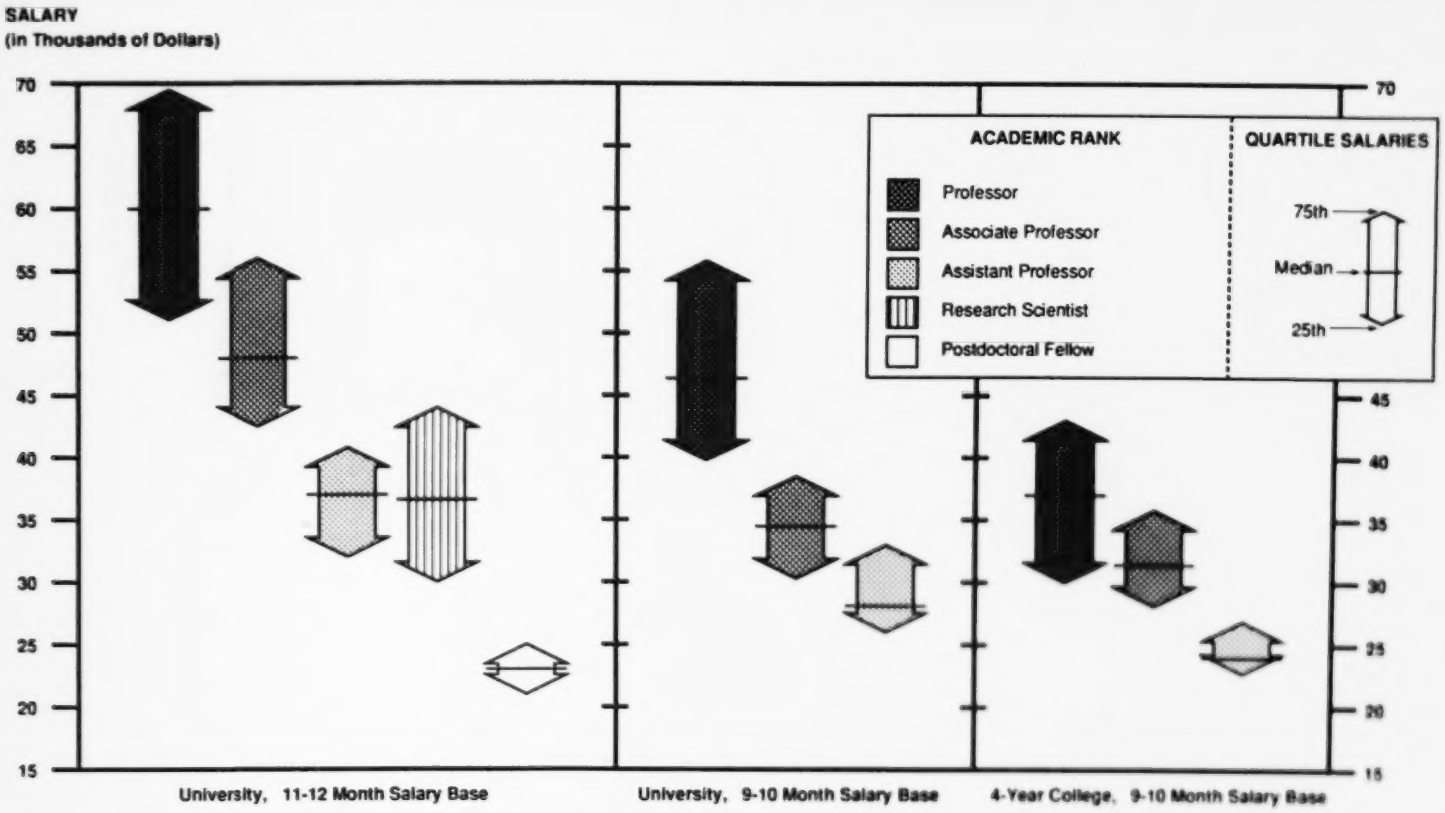

Figure 10. University and 4-year college salaries for PhDs by academic rank, 1986.

Salaries and Academic Rank

• Nearly half of all society members with a PhD work in academe. In general, the bulk of the academically employed work in universities, are somewhat older than their non-academic peers, and earn salaries at a rate below those outside academe.

• During the past ten years, the percentage of assistant professors in universities has steadily declined. Consequently, the median age of the professoriate has increased to over 50. As the bulk of the university faculty reaches retirement age in the 1990's, the impact of the aging of the professoriate will make itself felt.

• University professors employed on a 11–12 month salary base earned, on average, between $51,100 and $69,500 in 1986. The broad range reflects the variety of activities available to this group, including administration and grant-funded research.

Table 12. 1986 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor							
9–10 month salary	39.8	46.4	55.8	48.6	12.1	52	541
11–12 month salary	51.1	60.0	69.5	61.4	14.7	52	175
Associate Professor							
9–10 month salary	30.3	34.5	38.5	34.9	6.2	43	148
11–12 month salary	42.5	48.0	56.0	51.7	17.7	42	74
Assistant Professor							
9–10 month salary	26.0	28.1	33.0	29.7	5.0	34	107
11–12 month salary	32.0	37.0	40.8	37.2	9.1	35	61
Research Associate (11–12 month salary)							
Postdoctorates	21.0	23.0	25.0	23.3	3.4	32	71
Other Research Staff	30.0	36.6	44.0	38.1	10.1	39	55

Table 13. 1986 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor	30.0	37.0	43.0	37.3	8.7	50	59
Associate Professor	28.1	31.4	35.8	31.7	5.5	45	49
Assistant Professor	22.7	24.0	26.9	24.6	3.0	36	25

- The past two years have brought a sharp increase in the median salary paid to postdoctoral fellows. In 1986, postdocs earned a median salary of $23,000, a 9.5% increase from the previous year.

- A new academic track has emerged during the past decade: the research scientist. Close in age to associate professors, research scientists earn salaries comparable to assistant professors, but in general have no tenure and fewer teaching responsibilities.

- Median salary levels in 4-year colleges ranged from $24,000 to $37,000 in 1986. This is 10–25% lower at each professorial rank than salaries earned by those employed in universities on a 9–10 month salary base.

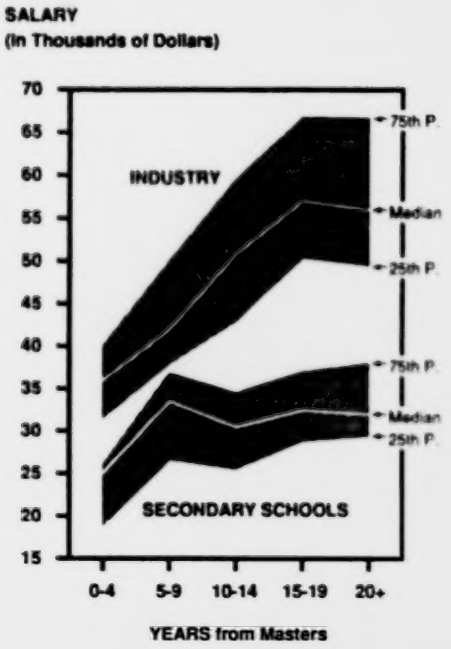

Figure 11. Salary structure in industry and secondary schools by years from Masters degree, 1986.

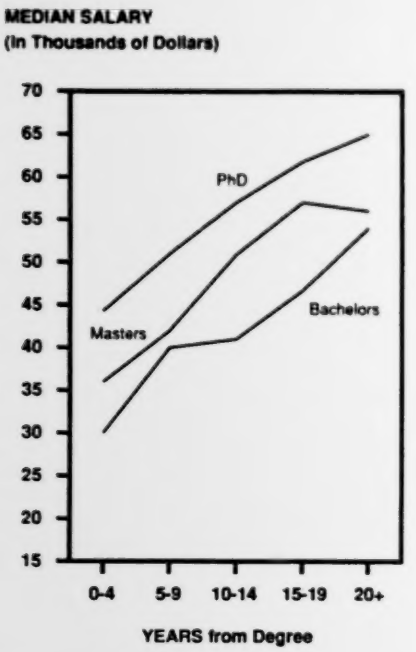

Figure 12. Median salaries in industry by degree level and years from degree, 1986.

SALARIES FOR MASTERS AND BACHELORS

• Median salaries of masters degree holders working in industry and teaching in secondary schools, underscore one of the central problems facing the scientific community today. While salary is hardly the sole reason for a physicist's choice of employer, the tremendous salary differentials observed between industrial and secondary school employment, at every experience level, must be considered as a major factor affecting initial employer choice and later employment mobility.

• The disparity in median salaries observed between industry and secondary schools for masters degree holders ranges from $11,000 for newly employed members to $24,000 for those with the most professional experience. It is therefore not surprising to find that of all the physics students granted masters degrees in 1986, and opting for employment, only 1% ended up working in the secondary school system while 32% procured jobs in industry.

• The only employment sector where comparisons between degree levels can be examined is industry. At all levels of professional experience, industrially employed PhDs receive higher salaries than their colleagues with lower degrees. In general, doctorates receive salaries $4,800 to $9,000 higher than society members holding masters degrees.

Table 14. 1986 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	34.0	34.0	6.8	49	56
Secondary School Teachers	30.7	30.8	7.4	46	157
Industry/Self-Employed	50.0	52.6	20.7	43	332
Government	43.5	45.6	12.0	45	81
FFR&DC	51.0	48.8	11.7	47	33
Hospital	42.0	44.1	11.1	38	47

Table 15. 1986 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)					
Secondary School (Teachers only)	0–4	18.8	25.0	26.0	23.1	6.2	37	18
	5–9	26.6	33.5	36.8	32.6	8.0	41	20
	10–14	25.5	30.5	34.5	29.8	6.4	44	37
	15–19	28.8	32.5	37.0	32.8	6.0	44	39
	20 +	29.4	32.0	38.0	32.3	7.6	54	41
Industry	0–4	31.5	36.0	40.0	36.5	8.8	29	47
	5–9	38.0	42.0	50.0	45.2	12.1	33	71
	10–14	43.0	50.9	59.5	52.5	17.8	38	53
	15–19	50.4	57.0	66.8	62.7	30.9	44	33
	20 +	49.5	56.0	66.7	60.1	20.9	56	123

Table 16. 1986 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	30.0	31.0	6.8	27	39
5–9	40.0	41.4	7.4	31	49
10–14	41.0	44.7	13.6	36	27
15–19	46.7	55.9	26.5	41	18
20 +	54.0	60.6	29.0	56	89

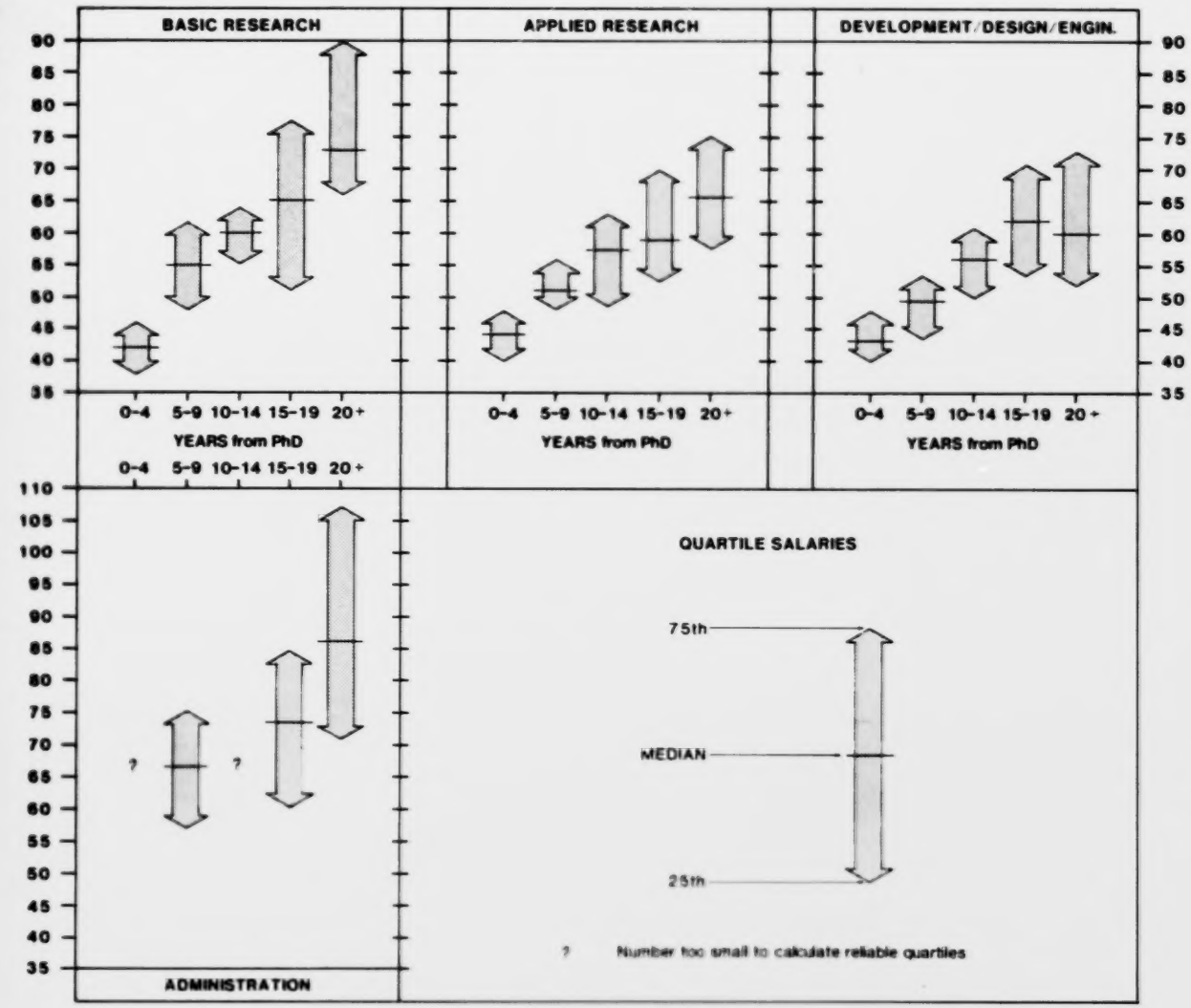

Figure 13. Industrial salaries by primary work activity and years from PhD, 1986.

Table 17. 1986 Industrial salaries by primary work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Basic Research							
0–4	38.0	42.0	46.0	43.1	11.4	30	39
5–9	48.0	55.0	61.5	55.4	10.7	35	31
10–14	55.1	60.0	64.0	60.1	9.3	39	21
15–19	51.0	65.0	77.5	66.6	17.9	43	20
20 +	66.0	73.0	90.0	78.0	18.6	55	34
Applied Research							
0–4	40.0	44.3	48.0	43.9	6.0	32	77
5–9	48.0	51.0	56.0	52.4	8.7	36	106
10–14	48.5	57.4	63.0	57.8	13.6	41	80
15–19	52.5	59.0	70.0	62.6	16.5	45	58
20 +	57.6	65.7	75.1	67.0	15.2	56	84
Development, Design and Engineering							
0–4	40.0	43.2	48.0	44.3	5.6	32	41
5–9	43.5	49.5	53.5	49.2	9.3	36	58
10–14	50.0	56.0	61.0	57.5	9.6	40	60
15–19	53.5	62.0	71.0	63.0	14.0	46	46
20 +	51.8	60.0	72.9	65.9	24.6	55	59
Administration							
0–4	*	*	*	*	*	*	2
5–9	56.7	66.5	75.0	67.2	16.9	36	18
10–14	*	*	*	*	*	*	15
15–19	60.0	73.3	84.5	72.6	18.3	45	37
20 +	70.8	86.0	107.0	91.7	29.9	55	58

**Number of respondents was too small to calculate reliable statistics.*

SALARIES AND PRIMARY WORK ACTIVITY

- Median starting salaries in industry are relatively consistent across work activities. The typical salary range for industrially employed PhDs with less than 4 years of experience was $40–48,000.

- PhDs engaged in non-administrative activities earn comparable salaries throughout most of their careers. However, those few scientists who are still engaged in basic research after 20 years appear to be making somewhat more than their colleagues doing applied work.

- Individuals in industry typically move into administration later in their careers; 45% of all PhDs who are primarily engaged in administration have 20 and more years of experience. Those individuals who shift into administration earn substantially more than their colleagues outside of administration.

Table 18. 1986 industrial salaries by sex and years from degree, PhDs.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–6				
Male	45.9	9.9	33	240
Female	41.0	6.2	32	26
7 +				
Male	60.5	20.1	46	749
Female	52.0	19.1	39	26

Table 19. 1986 academic salaries by sex and years from degree, PhDs.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–6				
Male	27.3	7.8	33	252
Female	26.0	5.8	33	31
7 +				
Male	44.5	15.3	49	1255
Female	40.0	14.8	47	66

PhD SALARIES FOR MALES AND FEMALES

- Men with PhDs holding entry-level positions in universities and 4-year colleges receive salaries that are 5% higher than their colleagues who are women. This salary difference seems to get larger for more experienced faculty for two reasons. First, the women, as a group, are somewhat younger and thus have somewhat less experience. Second, there is some evidence that women do not get promoted with the same rapidity as their male colleagues of comparable experience.

- Females, who are employed in industry, with PhDs for six or fewer years earn about 10% less than males. This salary difference appears to increase for more experienced workers in part because women are less likely than men to get into the highest paid administrative positions.

- Fewer than 1 in 30 PhDs working in industry with seven or more years of experience are female. This reflects the fact that prior to the 1980s women were unlikely to be employed in industry.

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Some separate but limited information on Canadian residents is also provided. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, where
$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence 1.96 at the 95% confidence level.

Medians:

M_1, that point below which p_1^{th} values fall,
M_2, that point below which p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, \; p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$p = 0.5$,
n = sample size,
z = coefficient of confidence, 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed.
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of intercity cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the All-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.